I. *Obſervations upon the Comet, that appear'd in the Months of* October, November, *and* December, 1723. *By the Reverend Mr.* Bradley, *M. A. Prof. Aſtron. Oxon. F. R. S.*

THE ſmall Comet which was ſeen in theſe Parts of *Europe*, in the Months of *October*, *November*, and *December*, 1723. was firſt obſerved in *England* by Dr. *Halley*, on *Octob.* 9. between 7 and 8 of the Clock in the Evening; it appearing then to the naked Eye not much unlike a Star of the third Magnitude. Looking at it through a Teleſcope, he ſaw ſome ſmall Teleſcopical Stars near it, whoſe Situation he noted together with the Comet's, in order to ſee which way it tended. About 9 he again viewed the Comet, and found it conſiderably moved from its former Station, having now paſſed a ſmall Star, which at the time of the firſt Obſervation was on the other ſide of it. Comparing the two Situations of the Comet together, he perceived that its apparent Motion at that time was about 8 or 9 Minutes in an Hour, in a Direction towards *Sagitta*; and that the Comet paſſed very near, if it did not wholly eclipſe the forementioned ſmall Star, whoſe place he afterwards found to be in ♒ 7° 22′ 15″ with 5° 2′ N. Latitude. From the Situation of the Comet at the time of the firſt Obſervation, he judged that it was in Conjunction with the Star at 8 *h.* 5′. equal Time. Note that the equal, and not the apparent, Time, is likewiſe made uſe of in all the following Obſervations.

The next Day he was pleaſed to communicate to me the Subſtance of what he had obſerved, whereby I was

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enabled, the Night following, to ſee the Comet at *Wanſted.* The Clouds hindered me from obſerving it in the manner that I had deſigned; but I had Time enough to meaſure its Diſtance (with a Micrometer in a Teleſcope of 7 Foot) from a Star in *Aquarius*, marked ε by *Bayer.* At 6 *h.* 21′ the obſerved Diſtance between this Star and the Comet was 1° 13′ 53″, and a great Circle paſſing through the Star and Comet, made an Angle with the Vertical Circle of 60° ¼. The Comet was more ſoutherly and weſterly than the Star. By this Obſervation the Comet preceded the Star in Right Aſcenſion 1° 3′ 50″ being 39′ 5″ more ſoutherly; ſo that the Comet's Right Aſcenſion was 307° 6′ 40″ and its Declination 11° 8′ 15″ S.

The Place of ε here aſſumed is according to the *Britiſh* Catalogue, as are alſo the Places of the other Stars hereafter mentioned from which the Comet was obſerved. The Right Aſcenſions and Declinations, which are here ſet down, of ſeveral ſmall Stars that are not in that Catalogue, were determined by obſerving the Differences of Right Aſcenſion and Declination between thoſe ſmall Stars and others that were in the Catalogue, and had nearly the ſame Declinations.

The ſame Evening, at 7 *h.* 3′ a ſmall Star that was more eaſterly than the Comet, and had about the ſame Declination with it, was diſtant from it 35′ 40″. About the ſame time another ſmall Star that had nearly the ſame Right Aſcenſion with the Comet, but was more ſoutherly, was diſtant from it 39′ 58″. The Places of theſe two Stars I have not yet obſerved.

The next Night proved cloudy, ſo that I could not ſee the Comet again till *October* 12. when (the Air being very ſerene and clear) we had an Opportunity of comparing it with two or three ſmall Stars that were near it; my Uncle, the Reverend Mr. *Pound*, aſſiſting in this and moſt of the following Nights Obſervations.

At 7 *h.* 22′ a ſmall Star, whoſe Right Aſcenſion was found 304° 40′ 23″ and its Declination 7° 8′ 22″ S. preceded the Comet in Right Aſcenſion 26′ 21″ being 10′ 42″ more Northerly. Hence the Comet's Right Aſcenſion was 305° 6′ 44″ and its Declination 7° 19′ 4″ S.

At 8 *h.* 50′ the Comet was in the ſame Parallel of Declination with another ſmall Star, whoſe Right Aſcenſion was found 305° 9′ 56″ and its Declination 7° 13′ 20″ S. and preceded the ſaid Star 6′ 20″ in Right Aſcenſion. Hence the Right Aſcenſion of the Comet was 305° 3′ 36″ and its Declination 7° 13′ 20″ S. Theſe Obſervations were made with a Teleſcope of 15 Foot furniſhed with a Micrometer, as were alſo all thoſe of the following Nights.

The next Night, *October* 13. 6 *h.* 58′ the Comet followed a ſmall Star, 4′ 10″ in Right Aſcenſion, being more Northerly than the Star 11′ 45″. The Clouds did not permit us to obſerve the Place of this Star; but its Right Aſcenſion muſt be about 304° 22′ and its Declination 6° 10′ S.

October 14. the Comet was near two Stars which are the 66th and 67th of *Aquila* and *Antinous* in the *Britiſh* Catalogue, and at 8 *h.* 57′ it followed the ſouthermoſt of them 20′ 37″ in Right Aſcenſion, being 29′ 8″ more ſoutherly. Hence the Comet's Right Aſcenſion was 303° 49′ 10″ and its Declination 4° 43′ 54″ S.

October 15. 6 *h* 35′ the Comet preceded the northermoſt of the ſaid Stars 23′ 6″ in Right Aſcenſion, being more ſoutherly than the Star 4′ 15″. Hence the Right Aſcenſion of the Comet was 303° 24′ 40″. Its Declination 3° 51′ 3″ S.

October 21. 6 *h.* 22′ a ſmall Star, whoſe Right Aſcenſion was found 301° 7′ 17″, and its Declination 0° 11′ 50″ S. preceded the Comet 41′ 6″ in Right

Aſcenſion, being 5′ 50″ more ſoutherly. Hence the Comet's Right Aſcenſion was 301° 48′ 23″ and its Declination 0° 6′ 0″ S.

October 22. 6 *h.* 24′ a ſmall Star, whoſe Right Aſcenſion was found 301° 39′ 47″ and its Declination 0° 32′ 43″ N. followed the Comet ½ a Minute in Right Aſcenſion, being 13′ 43″ more northerly. Hence the Comet's Right Aſcenſion, was 301° 39′ 17″ and its Declination 0° 19′ 0″ N.

October 24, 8 *h.* 2′ a ſmall Star whoſe Right Aſcenſion was found 301° 24′ 57″ and its Declination 1° 9′ 22″ N. preceded the Comet 0′ 37″ in Right Aſcenſion, being 5′ 12″ more Northerly. Hence the Comet's Right Aſcenſion was 301° 25′ 34″; and its Declination 1° 4′ 10″ N.

October 29, 8 *h.* 56′ a ſmall Star whoſe Right Aſcenſion was found 301° 6′ 20″ and its Declination 2° 51′ 0″ N. preceded the Comet one Minute in Right Aſcenſion, being 23′ 40″ more Northerly. Hence the Comet's Right Aſcenſion was 301° 7′ 20″ and its Declination 2° 27′ 20″ N.

October 30, 6 *h.* 20′. The ſame Star had exactly the ſame Right Aſcenſion with the Comet, being 11′ 33″ more Northerly. Hence the Comet's Right Aſcenſion was 301° 6′ 20″ and its Declination 2° 39′ 27″ N.

November 5, 5 *h.* 53′ a ſmall Star whoſe Right Aſcenſion was found 300° 35′ 00″ and its Declination 3° 45′ 30″ N. preceded the Comet 33′ 0″ in Right Aſcenſion, being 2′ 8″ more Southerly. Hence the Comet's Right Aſcenſion was 301° 8′ 0″ and its Declination 3° 47′ 38″ N.

November 8, 7 *h.* 6′ a bright Star (placed by *Hevelius* in *Roſtro Aquilæ,* but not inſerted in the *Britiſh* Catalogue) whoſe Right Aſcenſion at this time was found

found 302° 21′ 30″ and its Declination 4° 28′ 40″ N. followed the Comet 1° 7′ 40″ in Right Aſcenſion, being 13′ 3″ more Northerly. Hence the Comet's Right Aſcenſion was 301° 13′ 50″ and its Declination 4° 15′ 37″ N.

November 14, 6 *h.* 20′ a Star, whoſe Right Aſcenſion was found 301° 27′ 10″ and its Declination 4° 59′ 40″ N. preceded the Comet 5′ 35″ in Right Aſcenſion, being 5′ 50″ more Southerly. Hence the Comet's Right Aſcenſion was 301° 32′ 45″ and its Declination 5° 5′ 30″ N.

This was the laſt Time that I obſerved the Place of the Comet 'till after the Full Moon; my Affairs calling me to *Oxford*, where I had no Convenience for making ſuch Obſervations.

Dr. *Halley* and Mr. *Graham* continued to obſerve the Comet 'till *November* 20; and according to both their Obſervations that Evening at 7 *h.* 45′ the Comet followed β in *Collo Aquilæ* 6° 33′ 55″ in Right Aſcenſion, being about 4′ more Northerly than the Star. Hence the Comet's Right Aſcenſion was 301° 59′ 50″ and its Declination 5° 48′ 55″ N.

The Light of the Moon daily increaſing, prevented them from making any more Obſervations, the Comet being by this time grown ſo faint, as to become in a manner imperceptible while the Moon ſhone bright. And the faint Appearance which it made before the Moon obſtructed the Sight of it, gave little Hopes of its being to be ſeen again after the Full Moon. Notwithſtanding which on *December* 3. (being then near *Cirenceſter* in *Gloceſterſhire*) I was tempted by the Serenity of the Evening, and the Uſe of a very good Teleſcope of 10 Foot, to look for it again before the Moon roſe; and I found it among ſome ſmall Teleſcopical Stars; but it appear'd ſo faint and dull, as made it doubtful, whether what I took for the Comet might not be a ſmall Star with a little Hazineſs about it. But this Doubt was cleared two Nights after; when I perceived that the Comet was moved from its former Situation, towards a bright Teleſcopical Star, from which I afterwards took its Difference of Right Aſcenſion and Declination, upon my Return to *Wanſted*, on *Dec.* 7. This Star's Right Aſcenſion was then found 303° 39′ 20″ and its Declination 7° 32′ 30″ N. And *Decemb.* 7. 6 *h.* 45′ the Comet followed it 3′ 15″ in Right Aſcenſion, being 14′ more Northerly than the Star. Hence the Comet's Right Aſcenſion was 303° 42′ 35″ and its Declination 7° 46′ 30″ N.

This was the laſt Night that I ſaw the Comet, tho' I belive I might have continued to have obſerved it, had not an interrupted Succeſſion of cloudy Evenings prevented ſo long, that it became uncertain where to look for it.

The forementioned Obſervations are the Principal of all that were made at *Wanſted*; and moſt of them being taken from Stars which are not in the *Britiſh* Catalogue, whoſe Places therefore are here determined, only by comparing them with ſome that were; it cannot be ſuppoſed that the Comet's Places deduced from them are altogether exact. For which Reaſon I have all along ſet down, not only the Place of the Comet and Star where it was known, but alſo the Particulars of the Obſervation, that if any hereafter ſhould be willing to examine the Tract of this Comet more nicely, they may know where to find the Stars from which it was obſerved. The Places of the Stars here ſet down are abundantly ſufficient for that Purpoſe, as will appear from the following Table, which contains the Longitudes and Latitudes of the

the Comet deduced from the foregoing Obſervations, together with the Places of the Comet calculated from the Theory of Gravity, for the Times of Obſervation on the ſeveral Days therein mentioned, as alſo the Differences between the Obſerved and Computed Places. Thoſe Differences not exceeding one Minute, ſhew that the Obſervations are not only conſonant to each other, but that the Places of the Stars are likewiſe near the Truth, ſince the Comets Places deduced from them are found all along to agree ſufficiently near with the Theory of Gravity; the Truth of which having long ſince been eſtabliſhed by its great Author Sir *Iſaac Newton*, and my worthy Collegue Dr. *Halley*, needs not the Confirmation of ſo ſhort a Series of Obſervations as was made of this Comet. But ſhort as it is, I preſume 'twill be no eaſy Matter to account for the Obſervations with the ſame Degree of Exactneſs any other way, than by that Theory, according to which the following Computations are made.

1723. Temp. Æquat.				Comet. Long. Obſervat.				Lat. Bor. Obſerv.			Comet. Long Comput.				Lat. Bor. Comput.			Differ. Long.		Differ. Latit.	
	D.	*H.*	′		°	′	″	°	′	″		°	′	″	°	′	″		″		″
Octob.	9	8	5	♒	7	22	15	5	2	0	♒	7	21	26	5	2	47	+	49	−	47
	10	6	21		6	41	12	7	44	13		6	41	42	7	43	18	−	30	+	55
	12	7	22		5	39	58	11	55	0		5	40	19	11	54	55	−	21	+	5
	14	8	57		4	59	49	14	43	50		5	0	37	14	44	1	−	48	−	11
	15	6	35		4	47	41	15	40	51		4	47	45	15	40	55	−	4	−	4
	21	6	22		4	2	32	19	41	49		4	2	21	19	42	3	+	11	−	14
	22	6	24		3	59	2	20	8	12		3	59	10	20	8	17	−	8	−	5
	24	8	2		3	55	29	20	55	18		3	55	11	20	55	9	+	18	+	9
	29	8	56		3	56	17	22	20	27		3	56	42	22	20	10	−	25	+	17
	30	6	20		3	58	9	22	32	28		3	58	17	22	32	12	−	8	+	16
Nov.	5	5	53		4	16	30	23	38	33		4	16	23	23	38	7	+	7	+	26
	8	7	6		4	29	36	24	4	30		4	29	54	24	4	40	−	18	−	10
	14	6	20		5	2	16	24	48	46		5	2	51	24	48	16	−	35	+	30
	.20	7	45		5	42	20	25	24	45		5	43	13	25	25	17	−	53	−	32
Dec.	7	6	45	♒	8	4	13	26	54	18	♒	8	3	55	26	53	42	+	18	+	36

In order to determine the Orbit of this Comet, I ſuppoſed it to deſcribe a *Parabola* agreeable to what is delivered in the third Book of Sir *Iſaac Newton*'s *Princip. Math.* and then I found the Inclination of the Plains of the Orbit and Ecliptick 49° 59′. The Place of the Aſcending Node ♈ 14° 16′. The Place of the Perihelion ♉ 12° 52′ 20″. The Diſtance of the Perihelion from the Node 28° 36′ 20″. The Logarithm of the Perihelion diſtance 9.999414. The Logarithm of the Diurnal Motion 9.961007. The Time of the Comets being in its Perihelion, *Sept.* 16. 16^h 10′ equal Time. In its Orbit thus ſituated, the Motion of the Comet was Retrograde or contrary to the Order of the Signs.

From theſe Elements, by the Help of Dr. *Halley*'s general Table for Comets (to which they are adapted) I computed the Places in the forgoing Table; which agreeing with the obſerv'd Places as near as the Obſervations themſelves agree with one another, ſhew that it would be a vain Attempt to pretend to determine the true Ellipſe in which this Comet moves, or its Periodical Revolution, from ſo ſmall a Part of its Orbit as that was, which it deſcribed between the firſt and laſt of the forgoing Obſervations; this therefore muſt be left to Poſterity, eſpecially ſince it is certain, that this Comet is not one of thoſe of which Obſervations have hitherto been tranſmitted to us, ſufficient to determine the Situation of their Orbits.

The *Nucleus* of this Comet was very little, for it appear'd but of a ſmall Diameter when I firſt ſaw it, although it was then above three times nearer to the Earth, than the Sun is at its mean Diſtance. Its Tail was then hardly diſcernable with the naked Eye, but through a Teleſcope one might perceive a faint Light extending itſelf above a Degree from the Body.

I have not yet heard that this Comet was ſeen before *October* 6. although it was in a proper Situation to have been obſerved in the Morning, moſt part of *September*, eſpecially from the Time it was in its Perihelion, 'till near the End of that Month. For about that Time it croſſed the Milky-way between the Maſt of the Ship and the Head of the great Dog, paſſing between the bright Stars in the Body and Tail of the great Dog, towards the Head of the Dove, were it was about *September* 29. being by that time got ſo far towards the South-Pole, as not to riſe above our Horizon. From thence it paſſed under the Tail of *Xiphias* within about 15° of the South Pole of the Ecliptick; and moving on between the Head of *Hydrus* and the bright Star in *Eridanus* called *Acarnar*, it went by the Stars in the Body and Neck of the Crane about *October* 5. when it came again above our Horizon. From hence paſſing under the Tail of the Southern Fiſh, and between the Stars in the Shoulder of *Capricorn*, it croſſed the Ecliptick, *October* 8. in about 8° ½ of *Aquarius*. From thence it moved on by the Hands of *Aquarius* and *Antinous* towards the Head of the *Eagle*, according to its Courſe before deſcribed.

The Comet was in Oppoſition to the Sun *Octob.* 1. when it had near 74° Southern Latitude, and alter'd its Longitude two Signs in a Day. About *October* 3. it was in its Perigœon, or neareſt Diſtance to the Earth, being then almoſt ten times nearer to it than the Sun is at its mean Diſtance; and its apparent Motion was then about 20° in a Day, and when I laſt ſaw it, 'twas above twice as far off as the Sun.